

Listing of Claims:

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1. (Canceled)

2. (Currently Amended) ~~The microscope system according to claim 1, further~~ A microscope system in which an electronic camera is used to pick up an observation image by a microscope, comprising:

5 a controlling section for setting an image pickup operation of an image pickup element in said electronic camera to an optimum state in accordance with a state of at least one of an optical system combination for a projection magnification of at
" least an objective lens and a photo eyepiece on a microscope
10 side, an observation method, and lighting conditions;

 a microscope controlling section for controlling an operation of said microscope; and

 an image pickup element driving section for driving said image pickup element,

15 wherein said controlling section sets an image pickup element drive mode of said image pickup element driving section to a high speed drive mode, while the controlling section detects operation information outputted from said microscope controlling section.

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3. (Currently Amended) ~~The microscope system according to claim 1, further~~ A microscope system in which an electronic camera is used to pick up an observation image by a microscope, comprising:

5 a controlling section for setting an image pickup operation of an image pickup element in said electronic camera to an optimum state in accordance with a state of at least one of an optical system combination for a projection magnification of at least an objective lens and a photo eyepiece on a microscope
10 side, an observation method, and lighting conditions;

 a microscope controlling section for controlling an operation of said microscope; and

 an image pickup element driving section for driving said image pickup element,

15 wherein said controlling section sets a binning number of said image pickup element driving section based on an objective lens type outputted from said microscope controlling section.

4. (Original) The microscope system according to claim 3, wherein said controlling section comprises a memory in which a table of the objective lens type and the corresponding binning number is stored, compares the objective lens type outputted from
5 said microscope controlling section with said table to determine

the binning number, and sets the binning number as the binning number of said image pickup element driving section.

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5. (Original) The microscope system according to claim 3, wherein said controlling section comprises a memory in which a table of the objective lens type and a corresponding NA of a light image incident upon said electronic camera is stored, compares the objective lens type outputted from said microscope controlling section with said table to obtain the NA of the light image incident upon said electronic camera, obtains a resolution R of said light image from the NA, obtains the binning number as a maximum integer of 1 or more satisfying:

10 $B < R/2p$

when the binning number is B and an element pitch of said image pickup element is p, and sets the binning number as the binning number of said image pickup element driving section.

6. (Currently Amended) The microscope system according to claim ~~1~~ 2, further comprising:

~~a microscope controlling section for controlling an operation of said microscope;~~

5 ~~an image pickup element driving section for driving said image pickup element; and~~

an image forming lens and an intermediate magnification
change optical system,

wherein said controlling section sets a binning number of
said image pickup element driving section based on an objective
lens type, an image forming lens type and a zoom magnification of
the intermediate magnification change optical system outputted
from said microscope controlling section.

7. (Original) The microscope system according to claim 6,
wherein said controlling section comprises a memory in which a
table of the binning number corresponding to a combination of the
objective lens type, the image forming lens type and the zoom
magnification of the intermediate magnification change optical
system is stored, compares the combination of the objective lens
type, the image forming lens type and the zoom magnification of
the intermediate magnification change optical system outputted
from said microscope controlling section with said table to
determine the binning number, and sets the binning number as the
binning number of said image pickup element driving section.

8. (Original) The microscope system according to claim 6,
wherein said controlling section comprises a memory in which a
table of a combination of the objective lens type, the image
forming lens type and the zoom magnification of the intermediate

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5 magnification change optical system and a corresponding NA of a light image incident upon said electronic camera is stored, compares the objective lens type, the image forming lens type and the zoom magnification of the intermediate magnification change optical system outputted from said microscope controlling section with said table to obtain the NA of the light image incident upon said electronic camera, obtains a resolution R ($= 0.5\lambda/NA$ or $0.61\lambda/NA$: λ denoting one of wavelengths of lights constituting the light image) of said light image from the NA, obtains the binning number as a maximum integer of 1 or more satisfying:

15
$$B < R/2p$$

when the binning number is B and an element pitch of said image pickup element is p , and sets the binning number as the binning number of said image pickup element driving section.

9. (Original) The microscope system according to claim 6, wherein said controlling section comprises a memory in which a table of an NA and a magnification corresponding to the objective lens type is stored,

5 compares the objective lens type outputted from said microscope controlling section with said table to obtain the NA of the objective lens,

obtains an image forming magnification of an optical system of said microscope from the objective lens type, the image

10 forming lens type and the zoom magnification of the intermediate
magnification change optical system outputted from said
microscope controlling section,

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15 obtains the NA of a light image incident upon said
electronic camera from the NA of said objective lens and the
image forming magnification of said optical system by the
following equation:

NA = NA of the objective lens/the image forming
magnification of the optical system,

20 obtains a resolution $R (= 0.5\lambda/NA \text{ or } 0.61\lambda/NA: \lambda \text{ denoting}$
one of wavelengths of lights constituting the light image) of the
light image from the NA,

obtains the binning number as a maximum integer of 1 or more
satisfying:

$$B < R/2p$$

25 when the binning number is B and an element pitch of the image
pickup element is p, and

sets the binning number as the binning number of said image
pickup element driving section.

10. (Canceled)

11. (Currently Amended) The microscope system according to
claim \pm 2, further comprising:

~~a microscope controlling section for controlling an
operation of said microscope; and~~

5 an AE calculating section for performing an automatic
exposure control,

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Cont wherein said controlling section stops an exposure time
control in said AE calculating section, while the controlling
section detects information of light path change of said

10 microscope outputted from said microscope controlling section.

12. (Currently Amended) The microscope system according to
claim \pm 2, further comprising:

~~a microscope controlling section for controlling an
operation of said microscope; and~~

5 a frame memory for storing image data picked up by said
image pickup element,

wherein said controlling section stops rewriting of the
image data to said frame memory, while the controlling section
detects information of light path change of said microscope

10 outputted from said microscope controlling section.

13. (Currently Amended) The microscope system according to
claim \pm 2, further comprising:

~~a microscope controlling section for controlling an
operation of said microscope; and~~

- 5 a cooling section for cooling said image pickup element,
wherein said controlling section changes a set temperature
set to said cooling section in accordance with an observation
method outputted from said microscope controlling section.

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14. (Original) A microscope system in which an electronic
camera is used to pick up an observation image by a microscope,
comprising:

- 5 a controlling section for setting an adjusting operation of
an image picked up by said electronic camera to an optimum state
in accordance with a state of at least one of an optical system
combination for a projection magnification of at least an
objective lens and a photo eye piece on a microscope side, an
observation method, and lighting conditions.

15. (Canceled)

16. (Canceled)

17. (Original) The microscope system according to claim 14,
further comprising:

a microscope controlling section for controlling an
operation of said microscope;

5 an image adjusting section for adjusting image data picked
up by said image pickup element; and

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Cent an image forming lense and an intermediate magnification
change optical system,

wherein said controlling section comprises a memory in which
10 a shading correction pattern in accordance with an objective lens
type and a zoom magnification of the intermediate magnification
change optical system is stored, compares the objective lens type
and the zoom magnification of the intermediate magnification
change optical system outputted from said microscope controlling
15 section with a content of said memory, and sets the shading
correction pattern in accordance with the zoom magnification of
the intermediate magnification change optical system to said
image adjusting section, and

said image adjusting section performs a shading correction
20 of the image data in accordance with the set shading correction
pattern.

18. (Original) The microscope system according to claim 17,
wherein said shading correction pattern is a pattern in which a
gain correction value in accordance with a position on an image
pickup surface of said image pickup element is stored, and

5 said image adjusting section performs a gain correction of
the image data corresponding to the position on the image pickup

surface of said image pickup element based on the gain correction value of said pattern.

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19. (Original) The microscope system according to claim 14, further comprising:

a microscope controlling section for controlling an operation of said microscope;

5 an image adjusting section for adjusting image data picked up by said image pickup element; and

wherein said controlling section comprises a memory in which a shading correction pattern in accordance with an objective lens type is stored, compares the objective lens type outputted from
10 said microscope controlling section with a content of said memory, obtains the shading correction pattern in accordance with objective lens type, corrects the shading correction pattern in accordance with a zoom magnification of said intermediate magnification change optical system, and sets the shading
15 correction pattern to said image adjusting section, and

said image adjusting section performs a shading correction of the image data in accordance with the set shading correction pattern.

20. (Original) The microscope system according to claim 19, wherein said shading correction pattern is a pattern in which a

gain correction value in accordance with a position on an image pickup surface of said image pickup element is stored, and

5 said image adjusting section performs a gain correction of
B1 the image data corresponding to the position on the image pickup
Cost surface of said image pickup element based on the gain correction
value of said pattern.

21. (Original) The microscope system according to claim 14,
further comprising:

a microscope controlling section for controlling an
operation of said microscope;

5 an image adjusting section for adjusting image data picked
up by said image pickup element; and
and image forming lens,

wherein said controlling section comprises a memory in which
a shading correction pattern in accordance with a combination of
10 an objective lense and the image forming lens is stored, compares
an image forming lens type outputted from said microscope
controlling section with a content of said memory, and sets the
shading correction pattern in accordance with the image forming
lens type to said image adjusting section, and

15 said image adjusting section performs a shading correction
of the image data in accordance with the set shading correction
pattern.

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22. (Original) The microscope system according to claim 21, wherein said shading correction pattern is a pattern in which a gain correction value in accordance with a position n an image pickup surface of said image pickup element is stored, and

5 said image adjusting section performs a gain correction of the image data corresponding to the position on the image pickup surface of said image pickup element base d on the gain correcting value of said pattern.

23. (Original) The microscope system according to claim 14, further comprising:

 a microscope controlling section for controlling an operating of said microscope; and

5 an image adjusting section for adjusting image data picked up by said image pickup element;

 wherein said controlling section comprises a memory in which a color matrix in accordance with lighting conditions is stored, compares the lighting conditions outputted from said microscope controlling section with a content of said memory, and sets the
10 color matrix in accordance with the lighting conditions to said image adjusting section, and

 said image adjusting section performs a color conversion of the image data in accordance with the set color matrix.

24. (Canceled)

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25. (Currently Amended) ~~The microscope system according to claim 24, further~~ A microscope system in which an electronic camera is used to pick up an observation image by a microscope, comprising:

5 a controlling section for setting recording of an image picked up by said electronic camera to an optimum state in accordance with a state of at least one of an optical system combination for a projection magnification of at least an objective lens and a photo eyepiece on a microscope side, and an
10 observation method;

 a microscope controlling section for controlling an operation of said microscope; and

 an image recording section for recording image data picked up by said image pickup element,

15 wherein said controlling section sets a recording pixel number of an image recording section based on an objective lens type output by said microscope controlling section.

26. (Original) The microscope system according to claim 25, wherein said controlling section comprises a memory in which a table of the objective lens type and a corresponding NA of a

light image incident upon said electronic camera, obtains a
5 resolution $R (= 0.5\lambda/NA \text{ or } 0.61\lambda/NA: \lambda \text{ denoting one of the}$
wavelengths of lights constituting the light image) of the light
image from the NA, obtains the recording pixel number as a
maximum pixel pitch satisfying:

$$I_p < R/2$$

10 when a pixel pitch of a recorded image is I_p , and sets the
recording pixel number as the recording pixel number of said
image recording section.

27. (Currently Amended) The microscope system according to
claim ~~24~~ 25, further comprising:

~~a microscope controlling section for controlling an
operation of said microscope;~~

5 ~~an image adjusting section for adjusting image data picked
up by said image pickup element; and~~

an image forming lens and an intermediate magnification
change optical system,

wherein said controlling section sets a recording pixel
10 number of an image recording section based on an objective lens
type, an image forming lens type and a zoom magnification of an
intermediate magnification change optical system output by said
microscope controlling section.

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28. (Original) The microscope system according to claim 27,
wherein said controlling section comprises a memory in which a
table of a combination of the objective lens type, the image
forming lens type and the and the zoom magnification of the
intermediate magnification change optical system and a
corresponding NA of a light image incident upon said electronic
camera is stored, compares the objective lens type, the image
forming lens type and the zoom magnification of the intermediate
magnification change optical system outputted from said
microscope controlling section with said table to determine the
NA of the light image incident upon said electronic camera,
obtains a resolution R ($= 0.5\lambda/NA$ or $0.61\lambda/NA$: λ denoting one of
the wavelengths of lights constituting the light image) of the
light image from the NA, obtains the recording pixel number as a
maximum pixel pitch satisfying:

$$I_p < R/2$$

when a pixel pitch of a recorded image is I_p , and sets the
recording pixel number as the recording pixel number of said
image recording section.

29. (Original) The microscope system according to claim 27,
wherein said controlling section comprises a memory in which a
table of an NA and a magnification corresponding to the objective
lens type is stored,

5 compares the objective lens type outputted from said
microscope controlling section with said table to obtain the NA
of the objective lens,

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obtains an image forming magnification of an optical system
of said microscope from the objective lens type, the image
10 forming lens type and the zoom magnification of the intermediate
magnification change optical system outputted from said
microscope controlling section,

obtains the NA of a light image incident upon said
electronic camera from the NA of said objective lens and the
15 image forming magnification of said optical system by the
following equation:

NA= NA of the objective lens/the image forming magnification
of the optical system,

obtains a resolution $R (= 0.5\lambda/NA \text{ or } 0.61\lambda/NA: \lambda \text{ denoting}$
20 one of the wavelengths of lights constituting the light image) of
the light image from the NA,

obtains the recording pixel number as a maximum pixel pitch
satisfying:

$$I_p < R/2$$

25 when a pixel pitch of a recorded image is I_p , and

sets the recording pixel number as the recording pixel
number of said image recording section.

30. (Canceled)

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31. (Currently Amended) ~~The A~~ microscope system ~~according to claim 30, further~~ in which an electronic camera is used to pick up an observation image by a microscope, comprising:

5 a controlling section for setting a display method of the observation image in a display section to an optimum state in accordance with an operation state of said microscope; and

a microscope controlling section for controlling an operation of said microscope,

10 wherein said controlling section turns OFF displaying by said display section during exposure, when an observation method outputted by said microscope controlling section is a fluorescent observation.

32. (Currently Amended) ~~The A~~ microscope system ~~according to claim 30, further~~ in which an electronic camera is used to pick up an observation image by a microscope, comprising:

5 a controlling section for setting a display method of the observation image in a display section to an optimum state in accordance with an operation state of said microscope; and

a microscope controlling section for controlling an operation of said microscope,

wherein said controlling section displays a residual
10 exposure time in a part of said display section, and brings other
parts to a low luminance or non-emission state during exposure,
when an observation method outputted by said microscope
controlling section is a fluorescent observation, and static
image pickup is instructed.

33. (New) The microscope system according to claim 3,
further comprising:

an image forming lens and an intermediate magnification
change optical system,

5 wherein said controlling section sets a binning number of
said image pickup element driving section based on an objective
lens type, an image forming lens type and a zoom magnification of
the intermediate magnification change optical system outputted
from said microscope controlling section.

34. (New) The microscope system according to claim 33,
wherein said controlling section comprises a memory in which a
table of the binning number corresponding to a combination of the
objective lens type, the image forming lens type and the zoom
5 magnification of the intermediate magnification change optical
system is stored, compares the combination of the objective lens
type, the image forming lens type and the zoom magnification of

the intermediate magnification change optical system outputted
from said microscope controlling section with said table to
10 determine the binning number, and sets the binning number as the
binning number of said image pickup element driving section.

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35. (New) The microscope system according to claim 33,
wherein said controlling section comprises a memory in which a
table of a combination of the objective lens type, the image
forming lens type and the zoom magnification of the intermediate
5 magnification change optical system and a corresponding NA of a
light image incident upon said electronic camera is stored,
compares the objective lens type, the image forming lens type and
the zoom magnification of the intermediate magnification change
optical system outputted from said microscope controlling section
10 with said table to obtain the NA of the light image incident upon
said electronic camera, obtains a resolution $R (= 0.5\lambda/NA$ or
 $0.61\lambda/NA$: λ denoting one of wavelengths of lights constituting
the light image) of said light image from the NA, obtains the
binning number as a maximum integer of 1 or more satisfying:

15
$$B < R/2p$$

when the binning number is B and an element pitch of said image
pickup element is p, and sets the binning number as the binning
number of said image pickup element driving section.

36. (New) The microscope system according to claim 33,
wherein said controlling section comprises a memory in which a
table of an NA and a magnification corresponding to the objective
lens type is stored,

5 compares the objective lens type outputted from said
microscope controlling section with said table to obtain the NA
of the objective lens,

obtains an image forming magnification of an optical system
of said microscope from the objective lens type, the image
10 forming lens type and the zoom magnification of the intermediate
magnification change optical system outputted from said
microscope controlling section,

obtains the NA of a light image incident upon said
electronic camera from the NA of said objective lens and the
15 image forming magnification of said optical system by the
following equation:

NA = NA of the objective lens/the image forming
magnification of the optical system,

obtains a resolution R ($= 0.5\lambda/NA$ or $0.61\lambda/NA$: λ denoting
20 one of wavelengths of lights constituting the light image) of the
light image from the NA,

obtains the binning number as a maximum integer of 1 or more
satisfying:

$$B < R/2p$$

25 when the binning number is B and an element pitch of the image pickup element is p, and

sets the binning number as the binning number of said image pickup element driving section.

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37. (New) The microscope system according to claim 3, further comprising:

an AE calculating section for performing an automatic exposure control,

5 wherein said controlling section stops an exposure time control in said AE calculating section, while the controlling section detects information of light path change of said microscope outputted from said microscope controlling section.

38. (New) The microscope system according to claim 3, further comprising:

a frame memory for storing image data picked up by said image pickup element,

5 wherein said controlling section stops rewriting of the image data to said frame memory, while the controlling section detects information of light path change of said microscope outputted from said microscope controlling section.

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39. (New) The microscope system according to claim 3,
further comprising:

a cooling section for cooling said image pickup element,
wherein said controlling section changes a set temperature
5 set to said cooling section in accordance with an observation
method outputted from said microscope controlling section.